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FACTORS AFFECTING THE BOUNDARY DEMARCATION IN THE KAHUZI-BIEGA NATIONAL PARK, KIVU, D. R. CONGO

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ABSTRACT The Kahuzi-Biega National Park is one of the world heritage sites in the Democratic Republic of Congo. Its legal boundaries were not negotiated with local communities. Conflicts arose between park officials and surrounding communities. The German-Congo bilateral conservation project enhanced recognition of boundary demarcation in some communities, but not in others. This paper analyzes the factors positively or negatively affecting the boundary demarcation process. The participation of leading traditional chiefs to demarcation missions positively affected the boundary demarcation in proportion to the number of health centers and agricultural projects sponsored in the area. In contrast, written complaints lodged against the park from a particular category of "urbanized natives" hampered the boundary demarcation. Such complaints were correlated with the number of interferences of local communities' interests by the park. Law enforcement tended to reduce the number and length of challenged boundary sections.

Key Words: Boundary demarcation; Kahuzi-Biega National Park.

INTRODUCTION

The official boundaries of national parks and natural reserves are sometimes not recognized by local people. It is a major setback in conservation in sub-Saharan Africa. The park boundaries are often not demarcated in agreement with local communities (FAO, 1974; PNKB-GTZ, 2000). The traditional owners of the land continue to lay claim to their ancestral rights and even refute the existence of the protected area (Makabuza, 1986; von Fürstenberg, 1987; Hough, 1988; Mühlenberg *et al.*, 1995).

The Kahuzi-Biega National Park (KBNP) is one of the world natural heritage sites, registered no. 137 on September 5, 1980 (WHC, 1997). It is the main sanctuary of the endemic *Gorilla gorilla graueri* Matschie 1914. The baseline data of the decree no.75/238 dated July 22, 1975 which officially set up the boundary of the park misquoted some of the geographic landmarks and the park boundary was left without any demarcation. This loophole in the decree and in its implementation led to various interpretations, depending on whether one is a wildlife official or a member of the local communities. Some traditional chiefs bitterly complained of forceful land expropriation and expressed hostility against the KBNP. During several convened meetings with officials, people from the hinterland sometimes even changed names of known geographic landmarks in a bid to gain more space to the detriment of the park and accordingly to show their dissatisfaction. The land-owners perceived the establishment of the KBNP

as an obstacle to their benefits from the resources of the area. The application of exclusive conservation further worsened the conflicts to the point of threatening the existence of the KBNP. The matter is still not resolved, and as human populations keep growing they will demand more natural resources and space. Conflicts therefore, are likely to continue over the alignment of zone boundaries, park boundary demarcation and the levels of exploitation permitted within the park.

Under these circumstances, the adoption of participatory conservation was finally judged imperative (von Richter, 1991). A German-Congo cooperation project named "Integrated nature conservation in Eastern D. R. Congo" is operational since 1985. In 1990, the project started the park boundary demarcation activities. The perimeter of the KBNP covers 570 km including 370 km of clear natural park limits. In 1996, 114 km out of 200 km were demarcated in collaboration with local people (Kasereka, 1992; 1993; 1995b; 1996a; Murhula, 1997). According to park-rangers and local villagers, the participatory conservation approach has considerably reduced the conflicts (Kayeye, 1999; PNKB-GTZ, 2000).

However, despite the positive outcomes achieved by the conservation project in the surrounding villages (Dörken *et al.*, 1995; ma Mbaelele, 1995; Klug & Landu, 1996), there were complaints from some administrative units which hampered the boundary demarcation process. Hence, the same participatory approach has led to various responses from local communities as far as boundary demarcation is concerned. The present paper attempts to analyze the factors affecting the boundary demarcation of KBNP, and suggests how protected area authorities might go about overcoming the current crucial problem with respect to the boundary demarcation process.

METHODOLOGY

I. Definition of Some Key Concepts

The KBNP boundary is the boundary as defined in the presidential decree which created the park. A section of this official boundary can be challenged or non-challenged by the local communities. There is priority to place indestructible beacons at sections which are challenged. These are the sections of the boundary which are expected to be demarcated. The challenges from the local communities involve written claims sent to government land management offices or even violations of the official boundary by extending farms into the park and claiming the ownership of mines and hunting-areas within. Boundary demarcation is usually a long process involving lengthy negotiations to convince the local community. One day, when the traditional chief finally decides to participate in a boundary demarcation mission, there is a clear indication that a consensus about park acceptance has been reached in his community.

A demarcation mission is a team comprised of local community leaders, park

officials and some interest groups who refer to landmarks quoted in the park creation presidential decree to erect beacons and clear the area of shrubbery to plant trees, making the boundary once for good. The team members countersign the established proceedings.

"Urbanized natives" who are referred to in this paper are people who prospered from forests resources and who manage poaching-activities from their native villages (Kataraka, 2000). Those enriched villagers migrated to the provincial capital city, Bukavu, to secure their property, but they still pursue activities in their original villages. They tend to invest in encroaching on more and more land in the KBNP, and buy minerals from the miners who have settled inside the park. From time to time, they travel to their native villages to supervise activities and willingly misinform the local population as part of their lobbying strategies against the KBNP protection.

Based on the administrative subdivisions used in D. R. Congo, I establish a synonymy between "Groupement" (D. R. Congo's second last administrative unit) and "Collectivité" (D. R. Congo's administrative unit above the groupement) on one side, and "Location" and "Division" on the other as applied in Kenya, an Anglophone country. Location and Division are headed by traditional chiefs whose power is inherited. A Collectivité comprises 3 to 15 Groupements and a Groupement comprises many villages.

An Intervention Zone (I.Z.) of the support project does not necessarily coincide with administrative entities. These zones include a protection area inside the KBNP, and a development area in the hinterland. In most protection cases, an intervention zone extends to several traditional administrative entities.

II. The Study Area

Fig. 1 shows the KBNP and the 5 intervention zones of the support project. The study area covered all the Intervention Zones (I.Z.). The 7 study Divisions namely Buloho, Kabare and Mubuku in Tshivanga I.Z., Kalonge in Kalonge I.Z., Nindja in Nindja I.Z., Nzovu in Nzovu I.Z. and Itebero in Itebero I.Z. are headed each by a traditional chief. The first 2 belong to the original mountainous sector of the KBNP while the latter 3 belong to the 1975 extension area.

The original KBNP (600 km^2) dates back to 1937 as a Zoological Forest Reserve. In 1970, it was given the status of national park. It extends between an elevation of 2050 to 3308 m with highland forests. Outside the KBNP, the population density is high and reaches 300/km^2 in some areas (Mubalama, 1995; Mühlenberg *et al.*, 1995), with no forest remnants. Local people have no significant source of firewood, construction bamboo, medicinal plants and meat apart from the park (Mühlenberg *et al.*, 1995; Tchamba & Nshombo, 1996). The encroachment on land of KBNP may also be explained by the scarcity of arable land in these rural areas where >80% of the households belong to farmers. The mean acreage per household is 0.8 ha and the average family size is 7. The traditional social organization is hierarchical with a "Division chief" locally called Mwami, at the top. He is the traditional land manager.

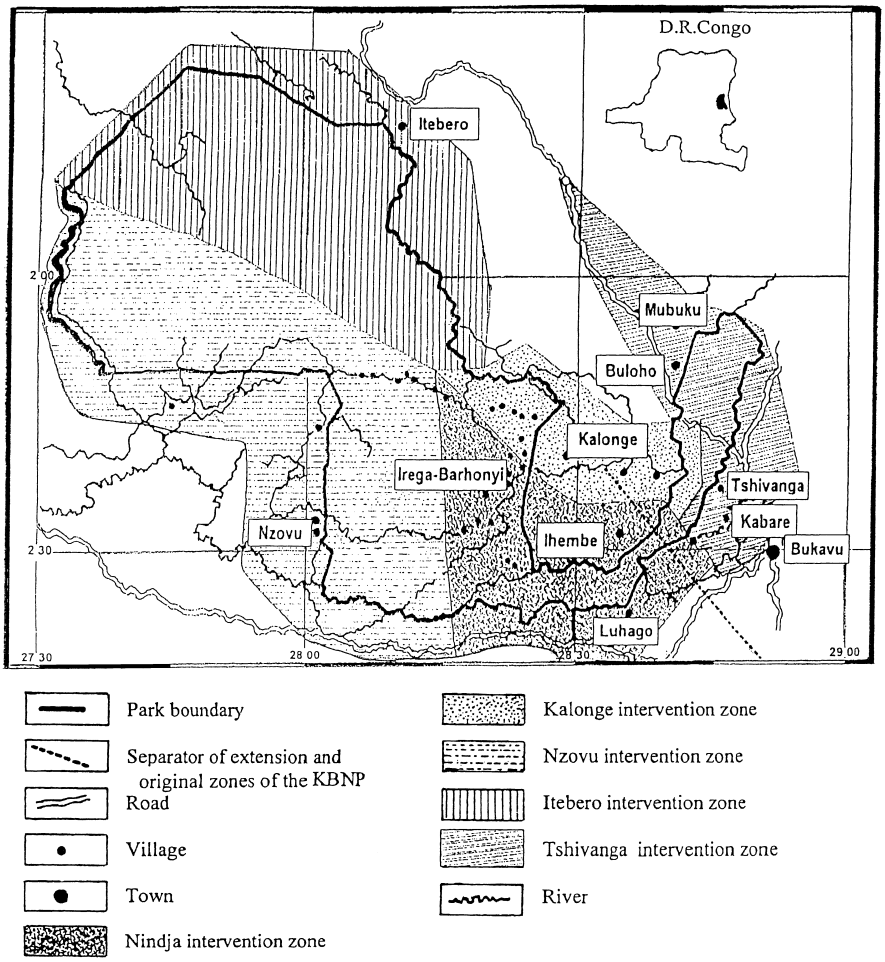

Fig. 1. Location of the Kahuzi-Biega Intervention Zones.

The extension zone dates back to the provisions of the presidential decree no. 75/238 of July 22, 1975. The park area encompassed 6000 km^2. This lowland sector stretches at an elevation ranging from 600 to 1200 m. There is a thick rainforest within and outside the KBNP. Some areas of the park are inhabited, but the population density is as low as 7/km^2. Forest-burning is practiced for shifting farming. The segmentary social organization prevails, where land is a property of the clan. The clan agglomerations are dispersed in the forest. KBNP is one of the major sources of bushmeat and minerals such as gold and colombium-tantalite (coltan). As many as 69 coltan quarries are operational and people living in those mining camps rely heavily on the KBNP for resources.

The mining of the coltan, a material much used in a range of high tech industries, particularly for cellular phones, has led to the settlement of 15,000 miners inside the park. They live on bushmeat from elephants, antelopes,

monkeys and gorillas. They also capture baby gorillas for export, which usually involves the massacre of whole gorilla families (Redmond, 2001).

The highland zone of KBNP is situated 45 km away from Bukavu town, while the lowland zone is between 46 and 300 km away from Bukavu. The two parts of the park also differ in terms of the level of wildlife conservation: in the extension, law enforcement started in 1985 in Itebero Division, and just in 1990 in Nzovu, while in the original part of the KBNP law enforcement dates back at least 20 years. While the extension zone covers 90% of the park, it has just 25% of park-rangers in contrast with the original part where gorilla-based tourism occurs.

III. Methods of Data Collection

Data were collected between 1990 and 1996 from reports and official letters available at the PNKB-GTZ Project in Bukavu. A total of 143 documents were analyzed including 65 on development projects, 35 on sensitization and 21 on law enforcement and boundary demarcation, while 22 documents recorded the interactions between KBNP and hinterland population. Frequencies of the study factors were recorded for each parameter in the 7 Divisions where the project operates. The study variables and related data are summarized in Table 1.

IV. Methods of Data Analysis

Data in Table 1 were analyzed using the computer program STATISTICA. Simple correlations between variables were calculated. Stepwise multiple regressions were computed with boundary demarcation parameters as dependent variables. The significant simple or multiple correlations were used to build a model which summarizes the relationship between variables that interact to explain the success or failure of boundary demarcation. Clusters were computerized to group the Divisions according to the study parameters.

RESULTS

I. Variation of Boundary Demarcation between the Divisions

Two groups occurred when the 7 Divisions were compared according to dataset from development program input, sensitization, law enforcement, interactions and park boundary demarcation level: Nindja and Nzovu as one group, and Kalonge, Itebero, Mubuku and Buloho as the other. Kabare was classified also belonging to the second group, although intermediate (Fig. 2).

Table 1 shows that Nindja and Nzovu are the only Divisions having villages with more than 4000 settlers. In both areas, law enforcement is recent and the length of a boundary section controlled by a ranger is on average 21 km. The achievements of the project were concentrated on two poles: Nzovu-center and

Table 1. Characteristics of the Seven Study Divisions (Collectivités).

Parameters \ Divisions	Buloho	Itebero	Kabare	Kalonge	Mubuku	Nindja	Nzovu
Population	16271	19715	153116	31607	19683	15654	47174
Development inputs							
- Number of sponsored schools	2	10	10	8	2	5	2
- Number of water supply micro-projects	0	5	1	46	8	17	1
- Number of health center micro-projects	2	2	0	5	1	1	2
- Number of agriculture micro-projects	2	2	5	4	0	3	2
- Number of bridge micro-projects	1	3	1	1	0	7	28
- Total achievements	7	22	17	64	11	33	35
Sensitization							
- Total number of meetings	4	6	8	4	2	9	5
- Total participants to meetings	120	277	718	141	213	185	159
- Frequency of presence of traditional chief	4	6	6	3	2	9	5
- Frequency of presence of religious leaders	1	5	3	2	1	5	2
- Frequency of presence of civil servant officials	4	4	5	4	1	7	3
- Frequency of presence of association representatives	4	5	4	4	2	7	3
Park-hinterland interactions							
- Settlers within KBNP	0	275	0	0	0	4642	5224
- Number of local interests limited by the park	4	2	5	1	1	9	1
- Complaints of population against the park	3	0	6	0	0	5	1
- Complaints of traditional chief against the park	1	1	0	1	2	6	0
- Complaints of “urbanized natives”	2	0	5	0	0	9	1
Law enforcement							
- Years since the law enforcement started	23	11	24	22	22	6	6
- Length of controlled boundary section (km)	27	166	46	38	19	118	156
- Number of park-rangers	8	8	37	9	9	6	7
- Number of patrols	94	68	543	122	87	142	75
- Number of poachers arrested	2	7	34	6	2	1	12
Boundary demarcation							
- Length of boundary expected to demarcate (km)	24	26	13	22	13	6	19.5
- Number of boundary demarcation missions	4	2	3	3	2	2	2
- Attendance of traditional chief at boundary demarcation missions	3	2	0	3	2	1	2
- Length of challenged boundary section (km)	0	0	7	0	0	6	3.5
- Length of non-challenged boundary section (km)	24	26	6	22	13	0	16
- Length of demarcated boundary (km)	24	26	13	22	13	0	16

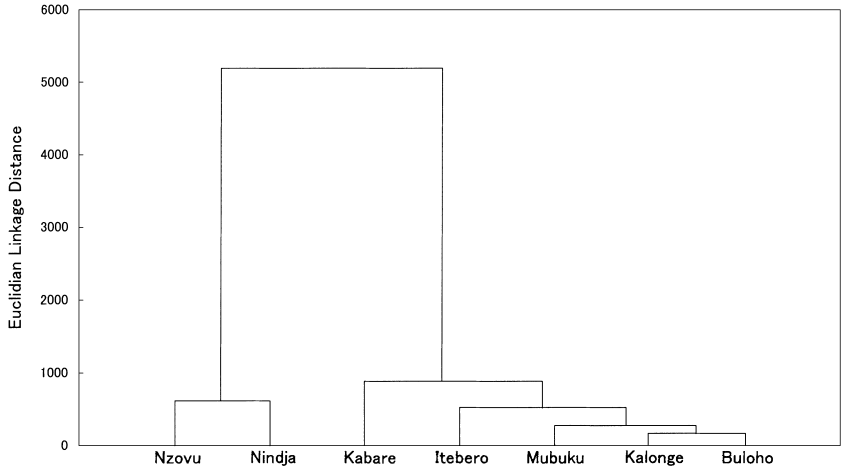

Fig. 2. Clustering of the 7 Divisions According to Deveropment Inputs in Table 1.

Luhago, one of the 3 Locations of Nindja. The 2 other Locations of Nindja which cover a longer section of the park boundary rejected the development scheme from the conservation project, most probably due to 9 complaints signed by "urbanized natives". An attempt at boundary demarcation by envoys of the provincial governor was brutally interrupted and rejected by armed local people. No boundary section was demarcated at Luhago, despite the project sponsored community and agricultural achievements there, because Luhago is under the rule of the chief of Nindja who stays at Ihembe, one of the 2 Locations where there was resistance against the project. However, the boundary demarcation was successful at Nzovu-center in contrast to the second Location of Nzovu, Bwise, which also lies along the park boundary but with no project-sponsored achievements.

Since 1937, when the highland zone was defined as a zoological and forest reserve, complaints from "urbanized natives" were recorded from Kabare. There were project-sponsored achievements, but were scattered over the territory. The traditional chief of Kabare did not participate at any park boundary demarcation mission, nor did he sign complaints against the park.

At Kalonge, Itebero, Mubuku and Buloho, on the other hand, there are no villages inside the park. There were no complaints from "urbanized natives" against the KBNP. Law enforcement is more intensive and has lasted longer. Except for Itebero, the length of a boundary section controlled by a ranger is short: 4.2 km (Kalonge), 2.1 km (Mubuku) and 3.4 km (Buloho). The Project achievements were dispersed over each Location and along the boundary to be demarcated. In those Divisions, the boundary demarcation was easy to make and, unlike Nindja, Nzovu and Kabare, no challenge was observed.

II. Parameters Affecting the Boundary Demarcation

The presence of the local traditional chief at demarcation missions and the reactions of "urbanized natives" significantly influenced the boundary demarcation. The length of demarcated boundary increased when the complaints from "urbanized natives" against KBNP diminished (Fig. 3). Also, when such complaints diminished, the non-challenged boundary increased ($r=-0.84$). The complaints from "urbanized natives" simultaneously increased with interference by the park into local interests. There are 9 such interests: residence concession, grazing area, freedom to cross the park without fee, farmland, forest product gathering, firewood, loss of ancestral land, uncertainty of ownership and loss of crops due to animal destruction. Whenever the number of interferences to local interests increased, so did the complaints from the population, and the complaints countersigned by the traditional chief against KBNP also increased.

Non-challenged boundary sections likewise increased the frequency of traditional chief attendance during boundary demarcation missions (Fig. 4). There is a positive correlation between the attendance of the traditional chiefs at boundary demarcation missions and the number of health center and of agricultural micro-projects by the KBNP-GTZ implemented in a given area ($R^2=0.98$; $P<0.0004$). Even when the number of participants at sensitizing meetings diminished, the frequency of other community leaders (religious leaders, civil servant officials and association representatives) simultaneously increased ($r>0.85$) with the presence of the traditional chief at the same meetings.

The length of the non-challenged boundary section increased when law enforcement was implemented for a longer time. Also, when the number of park-rangers and the total length of the patrolled boundary section increased, the length of the non-challenged boundary section increased as well ($R^2=0.95$; $P=0.001$). The length of the demarcated boundary increased under the synergetic effect of these same parameters.

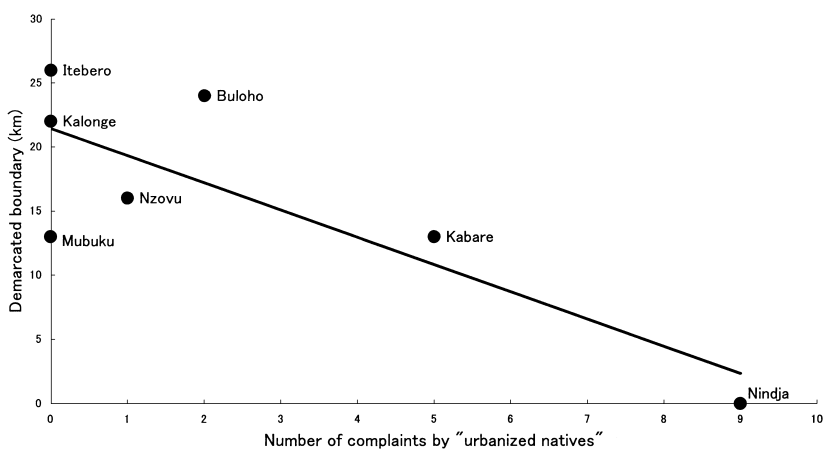

Fig. 3. Influence of "Urbanized Natives" on Park Boundary Demarcation.

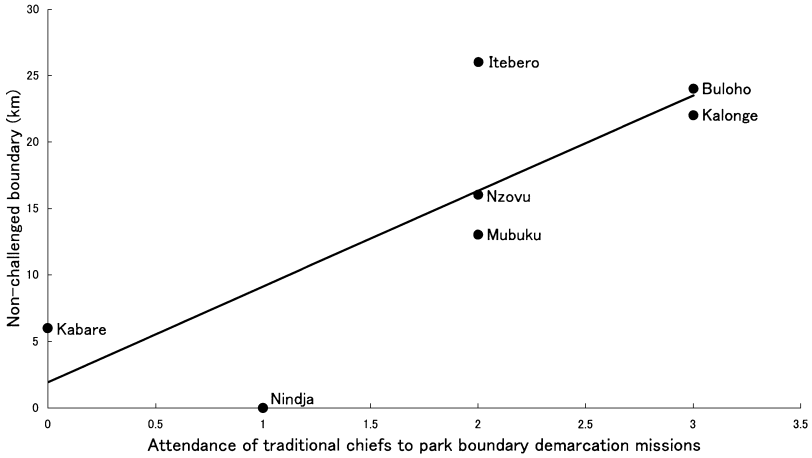

Fig. 4. Influence of Traditional Chiefs on Boundary Acceptance.

The park-hinterland interactions also affected the level of hostility against the park boundary: the length of the challenged boundary section increased with the number of inhabitants inside the boundary and complaints countersigned by the traditional chief against the KBNP (R^2=0.98; P=0.0008). Also, the challenged boundary section increased when the number of roads and bridges (r=0.98) increased, as well as the predefined length of boundary to be demarcated (r=0.96).

DISCUSSION

I. A Logical Model in the Boundary Demarcation Process

The logical model deducted from the results contains 5 components: sensitization, development input, law enforcement, boundary demarcation and interactions between KBNP and human communities living in the hinterland. Such an interaction of various factors is typical within an integrated approach which is systemic and takes into account several parameters in the achievement of a specific goal (von Richter, 1991; Maldague, 1997). Interactions are displayed within and between these components (Fig. 5). Factors with direct effects on boundary demarcation include the law enforcement, the participation of the main traditional chief to boundary demarcation missions, as well as those belonging to the components of KBNP-population interactions. Development inputs and sensitization had an indirect effect on boundary demarcation. Within the sensitization component, only the number of participants in conservation meetings mattered as negative influence onto the participation of Division traditional chiefs to demarcation missions, although there were originally 6 parameters.

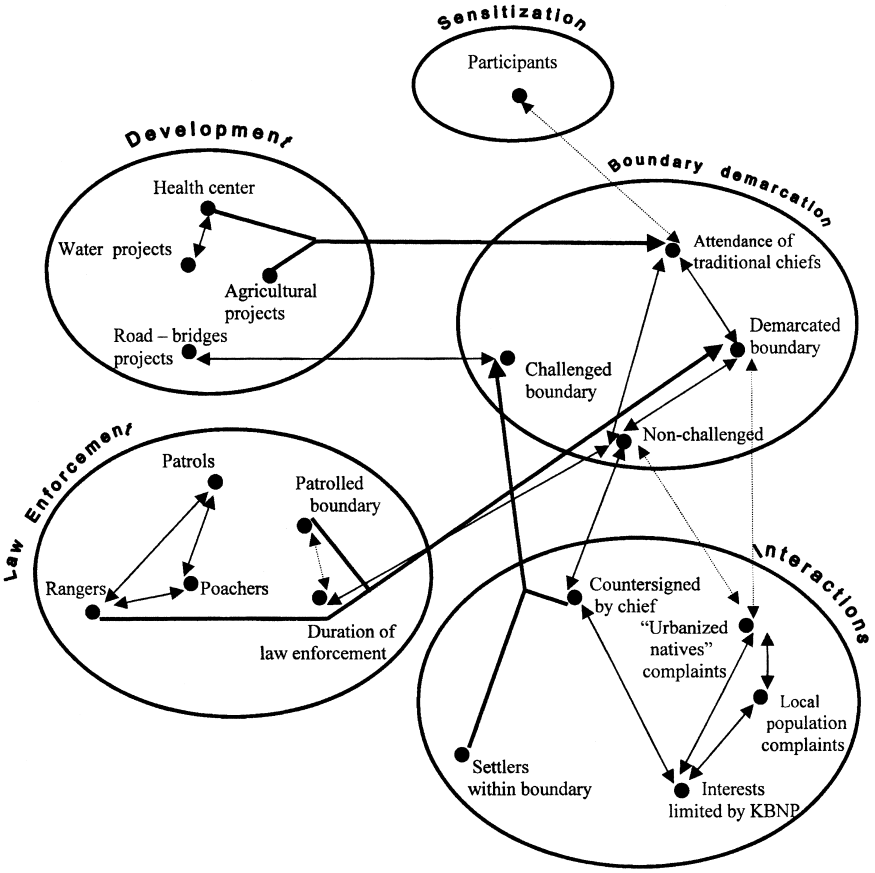

Fig. 5. A Model Summarizing the Factors which Significantly Affect the Boundary Demarcation in Kahuzi-Biega National Park. (thick line=multiple regression; thin line=positive correlation; dotted line=negative correlation)

II. The Impact of Development Inputs and Sensitization

Among variables related to development inputs, only health center and agricultural projects tended to stimulate the participation of the traditional chief. When development inputs are finally consistent and useful for a large number of beneficiaries, such as the provision of health centers, they elicit the presence of the traditional chief to boundary demarcation missions. But hostility against the park boundary may arise despite inputs, when they were not appreciated by the hinterland people, such as the maintenance of bridges and secondary roads which barely lead to tractable major roads where only four-wheel-drive lorries would venture. The impact of such farm paths is negligible on overall local economy. Those secondary roads are perceived just as a support to law enforcement. Wherever roads have promoted the local economy, they stimulated the acceptance of protected areas by the hinterland communities (Wells *et al.*,

1992).

III. The Impact of Lobbies against Park Conservation

In areas where the KBNP is inhabited by more than 4000 people, the claims of interests are very important. "Urbanized natives" take advantage of such claims to incite population against the park boundary demarcation. This finding is similar to those from the sociological study on peasant resistance against KBNP (Masheka, 1997), where it was shown that "urbanized natives" from Nindja actively supported the popular claims against the KBNP. Their opposition may just be a strategy to secure their interests in the park (Kasereka, 1995a).

IV. The Importance of Law Enforcement

The demarcation of park boundaries was successful when law enforcement increased and when the support from the local community was ensured. Law enforcement was stronger as its presence was longer (10 years or more) and where the patrol density was as high as 1 ranger per 3.2 km boundary section. Sufficient law enforcement before boundary demarcation was already estimated as a key to success (PNKB-GTZ, 2000). Without repression, the defrauders of natural resources from the KBNP would not be involved in the boundary-related conflict resolutions and they would rather carry on with their illegal activities (Ferraro & Kramer, 1995; Lewis, 1996). The efficiency of law enforcement needs to be boosted with development inputs (Ferraro & Kramer, 1995).

The failure to demarcate the park boundaries was linked to weak law enforcement where interests were claimed inside KBNP. That was the case in the extension zone where law enforcement was present for only 6 years and where the patrol was as weak as a ranger per 21 km boundary section.

V. The Influence of Traditional Chiefs

The participation of the traditional chief to boundary demarcation missions is an indicator of the acceptance of the boundary by the local communities. The results suggest that queries on park boundary demarcation are not solved in populous sessions where the most vocal orators just seek sympathy from people whose interests had been hampered by the KBNP.

Queries on boundary demarcation are efficiently solved in gatherings of leaders with a clear custom or administrative mandate to manage the land. These leaders are usually chiefs of clans, hierarchically below the major traditional chief in the lowland part of the KBNP, or advisors of the "Division traditional chief" in the highland part. The other leaders are the religious, the civil servant officials and the associations representatives. The competence of local community leaders has been recognized as an important factor in natural

resources management (Makabuza, 1986; von Richter, 1991; Lazarev, 1993).

Whenever the traditional chief willingly joined the park boundary demarcation team, the limits were implemented, and a report countersigned by him and KBNP officials was thereby produced, legitimating the acceptance of the park limits in that area (Kasereka, 1996b). In Divisions where the KBNP had existed as a reserve since 1937, conservation has become a tradition. Villagers as a community recognize the KBNP (Tchamba & Nshombo, 1996). In such Divisions, the boundary demarcation has usually been feasible with the relevant representatives without the traditional chief (mainly in Kabare).

However, when the major claims from local community remain unsolved as in Nindja, the traditional chief sometimes participated to boundary demarcation missions which were initiated by the political and administrative hierarchy. But in such cases, his behavior remained equivocal, pretending to support the administrative endeavor but, on the other hand, actively sharing views of vindictive “urbanized natives” and other detractors against KBNP (Masheka, 1997).

CONCLUSION

The study shows that boundary demarcation of KBNP was positively influenced by the participation of traditional chiefs at demarcation missions. The presence of the chief at demarcation missions, in turn, is proportional to the number of health center and agricultural projects sponsored in the area. The boundary demarcation process was negatively affected by the number of complaints signed by “urbanized natives” from study areas. Those complaints are significantly linked with the number of the interests that were limited by the park.

Law enforcement tended to reduce the number and length of challenged boundary sections and to increase the success of boundary demarcation. Law enforcement is thus necessary. Law enforcement and sensitizing should be enhanced especially in areas where development inputs were rejected in a strategy to hamper the park boundary demarcation process for pursuing poaching activities. Development inputs should be enhanced in all Locations around KBNP. Such inputs elicit the commitment of local people to park boundary demarcation and conservation. That acceptance is indicated by the presence of the local traditional chief at boundary demarcation missions. His presence leads to successful boundary demarcation, where the local community considers the development inputs more rewarding than the poaching of natural resources from the park, thus more beneficial.

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